

CLAIMS:

- 1 1. A stator winding for use in a rotating electric machine having a slotless stator,
being a hollow cylindrical body formed by:
3 forming turns by winding a wire sheaf of a plurality of fine wires composed of
4 conductors bundled together, through one turn in an approximate rhombic shape;
5 forming approximate rhombic shape coil segments comprising a continuous
6 length of said wire sheaf by winding and arranging a plurality of said turns so as to be
7 sequentially shifted continuously in the direction of one diagonal of said rhombic shape,
8 forming a band shape body using a plurality of said coil segments with these coil
9 segments sequentially shifted in the direction of said one diagonal and so as to be
10 adjacent to each other, and rolling said band shape body into a cylindrical shape.
- 1 2. A stator winding according to claim 1, wherein with said wire sheaf, one end
2 portion of opposite end portions of said respective turns which are located in the
3 direction of an other diagonal orthogonal to the direction of said one diagonal is wound
4 from an inner peripheral side of said hollow cylindrical body to an outer peripheral side,
5 and an other end portion of said opposite end portions of said respective turns, is wound
6 from the outer peripheral side to the inner peripheral side.
- 1 3. A stator winding according to either one of claim 1 and claim 2, wherein with
2 said respective turns, opposite end portions which are located in the direction of an other
3 diagonal orthogonal to the direction of said one diagonal, have bent back portions which

4 proceed so as to project towards an outside of said turn, and then return back in an
5 approximate U-shape and proceed so as to return towards an inside.

1 4. A stator winding according to any one of claim 1 through claim 3, wherein said
2 respective turns are arranged in a condition touching adjacent turns.

1 5. A stator winding according to any one of claim 1 through claim 4, wherein of the
2 four sides of said approximate rhombic shape coil segments, two sides located on one
3 side of said other diagonal are arranged on an inner peripheral side of said hollow
4 cylindrical body,
5 and the other two sides opposite to the two sides located on said one side are
6 arranged on an outer peripheral side of said hollow cylindrical body.

1 6. A stator winding according to claim 5, wherein the two sides of the coil segment
2 which are arranged on the inner peripheral side are abutted in the circumferential
3 direction against said two sides which are arranged on the inner peripheral side of the
4 adjacent coil segment,

5 and the respective coil segments are arranged sequentially shifted while being
6 overlapped so as to radially overlap said two sides of the adjacent coil segments, which
7 are arranged on the outer peripheral side.

1 7. A stator winding according to any one of claim 2 through claim 6, wherein said
2 bent back portions are bent from the inner peripheral side of said hollow cylindrical body

3 towards the outer peripheral side, or from the outer peripheral side towards the inner
4 peripheral side.

a 1 8. A stator winding according to ~~any one of claim 1 through claim 7~~, wherein said
2 wire sheaf is twisted at least one turn in a helical form within a range of one side of the
a 3 respective approximate rhombic ~~shape~~ ^{shaped} turns.

a 1 9. A stator winding according to ~~any one of claim 1 through claim 8~~, wherein said
a 2 wire sheaf has an approximately rectangular ~~shape~~ ^{shaped} cross-section.

a 1 10. A stator winding according to ~~any one of claim 1 through claim 9~~, wherein said
2 fine wires have a distorted circular cross-section with linear portions, and adjacent fine
a 3 wires are contacted ^{together} at said linear portions.

1 11. A method of manufacturing a stator winding wherein with a method of
2 manufacturing a stator winding used in a rotating electric machine having a slotless
3 stator, which incorporates:

4 a turn forming step for forming turns by winding a wire sheaf of a plurality of
5 fine wires composed of conductors bundled together, through one turn in an approximate
6 rhombic shape;

7 a coil segment forming step for forming coil segments comprising a continuous
8 length of said wire sheaf by winding and arranging a plurality of said turns so as to be
9 sequentially shifted continuously in the direction of one diagonal of said rhombic shape;
10 and

11 a hollow cylindrical body forming step for forming a band shape body using a
12 plurality of said coil segments by overlapping these coil segments so as to be
13 sequentially shifted in the direction of said one diagonal and adjacent to each other, and
14 rolling said band shape body into a hollow cylindrical shape,
15 said turn forming step includes a step where with said wire sheaf, one end portion
16 of opposite end portions of said respective turns which are located in the direction of an
17 other diagonal orthogonal to the direction of said one diagonal is wound from an inner
18 peripheral side of said hollow cylindrical body to an outer peripheral side, and an other
19 end portion of said opposite end portions of said respective turns, is wound from the
20 outer peripheral side to the inner peripheral side.

1 12. A method of manufacturing a stator winding according to claim 11, wherein said
2 turn forming step incorporates a bent back portion forming step for forming bent back
3 portions at opposite end portions of said respective turns which are located in the
4 direction of the other diagonal orthogonal to the direction of said one diagonal, which
5 proceeds so as to project towards an outside of said turn, and then returns back in an
6 approximate U-shape and proceeds so as to return towards an inside.

a 1 13. A method of manufacturing a stator winding according to ~~either one of claim 11~~
a 2 ~~and claim 12~~, wherein said turn forming step incorporates a press step for pressing said
a 3 wire sheaf so that adjacent fine wires are closely contacted. *together*

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1 14. A method of manufacturing a stator winding according to claim 13, wherein
2 prior to said press step there is provided a step for twisting said wire sheaf at least one
3 turn in a helical form within a range of one side of said approximate rhombic shape turn.

a 1 15. A method of manufacturing a stator winding according to ~~either one of~~ claim 13
2 ~~and claim 14~~, wherein said press step incorporates a step for forming said wire sheaf so
a 3 that said wire sheaf has an approximately rectangular cross-section.

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